

Low Power, Small Form Factor, High Performance EVA Radio Employing Micromachined Contour Mode Piezoelectric Resonators and Filters, Phase I

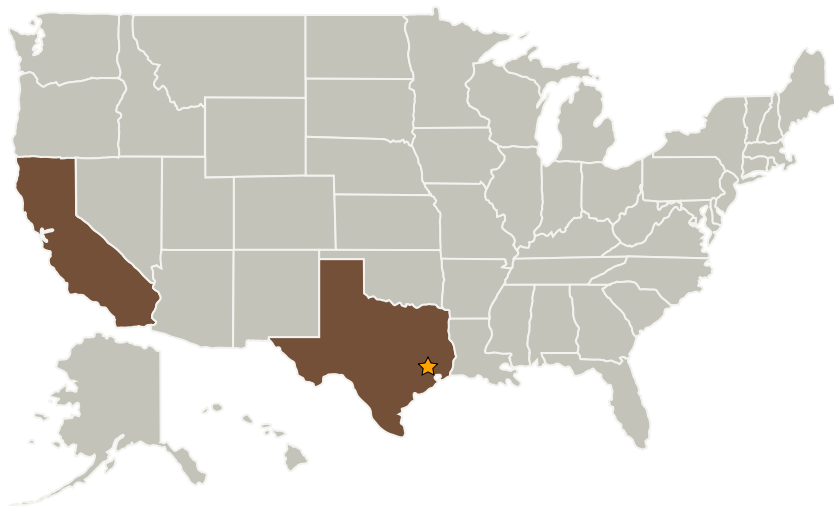
Completed Technology Project (2007 - 2007)



Project Introduction

In Phase I Harmonic Devices proposes to investigate the feasibility of a low-power, low-volume, lightweight, frequency agile, and fault tolerant EVA radio based on the co-design of the transceiver with high Q contour mode piezoelectric resonators and filters, low-loss switches, and tunable capacitors. The radio will span from VHF to S-band frequencies (or higher) and support voice, data, and video capabilities. HDI's contour mode aluminum nitride (AlN) technology allows the CAD level definition of arrays of filters, resonator, switches, and tunable capacitors, with operating frequencies from 10 MHz to several to several GHz, all on a single silicon chip. The proposed work represents a radio architecture paradigm shift in which arrays of high-Q micromachined elements (resonators, switches, tunable capacitors) are embedded in the transceiver circuit blocks. Conceptually, the library of low-Q circuit elements (resistors, inductors, capacitors) traditionally available to the RFIC designer are supplemented with HDI's high-Q components. In the Phase I study HDI will design and evaluate novel high-Q component-based transceiver circuit blocks (LNA, oscillators/synthesizers, power amplifiers, etc.), optimize the design of its RF micromachined components for embedding in RFICs, and determine the optimum radio architecture to leverage its high-Q micromachined component technology.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
★ Johnson Space Center(JSC)	Lead Organization	NASA Center	Houston, Texas
Harmonic Devices, Inc.	Supporting Organization	Industry	Berkeley, California

Primary U.S. Work Locations	
California	Texas

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Johnson Space Center (JSC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX05 Communications, Navigation, and Orbital Debris Tracking and Characterization Systems
 - TX05.2 Radio Frequency
 - TX05.2.7 Innovative RF Technologies